REMARKS

This timely responds the Office Action mailed May 21, 2004. Claims 52-102 are currently pending in the application, of which claims 52, 77, 81, 82, 86 and 93 are independent claims.

In view of the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

Rejections Under 35 U.S.C. § 103

Claims 52 and 55-85 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U. S. Patent No. 5,473,455 issued to Koike, *et al.* ("Koike") in view of U. S. Patent No. 5,608,556 issued to Koma ("Koma"). Applicants respectfully traverse this rejection for at least the following reasons.

With respect to claims 51 and 55-76, independent claim 51 recites:

> "52. A liquid crystal display comprising:
> a first substrate;
> a common electrode formed on the first substrate;
> a plurality of protrusions formed on the common electrode;
> a second substrate facing the first substrate; and
> a pixel electrode having a plurality of apertures and formed on the second substrate."

In other words, the protrusions are formed on the common electrode and the apertures are formed at the second substrate facing the common electrode.

In the Office Action, the Examiner stated Koike discloses, in Figs. 50 and 51, "a common electrode (24) having a protrusion portion (26p)" and "a pixel electrode (21) having a depressed portion (22d)" (Office Action, page 2). However, in Fig. 50, the element 24 is a pixel electrode, not a common electrode, and the element 21 is a common electrode, not a pixel electrode. To confirm this, the Examiner is respectfully requested to review the descriptive portion of the specification corresponding to Figs. 50 and 51, for example, column 20, lines 23-64.

Koike fails to show the protrusions formed on the common electrode 21 and the apertures formed at the pixel electrode 24. The Examiner stated that Koma shows, in Fig. 8, an orientation control window 33b formed at the pixel electrode 17. Even if Koike is modified such that the portion 26p is replaced with the orientation control window 33b of Koma, the resulting structure would be the depressed portion 22d formed at the common electrode 21 and an orientation control window formed at the pixel electrode 24. Thus, the resulting structure still fails to show "a plurality of protrusions formed on the common electrode", as claimed.

Also, what Koike is disclosing is the liquid crystal 20 aligned to coincide with the surface shape of the alignment layer 22 having the depression 22d, *not* a depression of the common electrode 21 generating a fringe field that influences alignment of the liquid crystal 20.

In Figs. 50 and 51 of Koike, the common electrode 21 is formed on the lower transparent glass plate 16, and the alignment layer 22 is formed on the common electrode 21. The pixel electrode 24 is formed on the upper transparent glass plate 18, and the alignment layer 26 is formed on the pixel electrode 24. As described in column 20, lines 24-31, the alignment layers 22 and 26 have the depression 22d and the projection 26p.

The liquid crystal 20 has "a tendency to align depending on the surface shape of a structure that the liquid crystal 20 contacts" and "this alignment coincides with the alignment caused by the rubbing direction. Accordingly, the portion 22d and 26p of the alignment layers 22 and 26 help the alignment of the liquid crystal 20 to improve the behavior of the liquid crystal 20 at the boundary between the liquid crystal aligning domains A and B" (column 20, lines 32-43).

As such, Koike is not relying on the fringe field generated by the depression of the common electrode 22d. Rather, Koike only relies on the tendency of the liquid crystal 20 to align the surface shape of the alignment layer 22. For this reason, the same result would be achieved even if the structure of Koike is modified such that a layer is formed between the common electrode 21 and the alignment layer 22 and the common electrode 21 is formed to be flat at the portion corresponding to the depression 22d of the alignment layer 22. Thus, it is submitted that Koike does not disclose or suggest a depression of the common electrode 21 generating a fringe field that influences alignment of the liquid crystal 20.

Even if the depression 22d is formed to generate a fringe field, there is significant difference between a fringe field generated by the depression 22d and a fringe field generated by an aperture (e.g., operation control window 33b of Koma). For example, the fringe field generated by an aperture is much bigger than that generated by an depression. Thus, in order for the depression 22d to generate the same amount of fringe field generated by the aperture, the depression 22d should be formed to be significantly deeper or wider. To increase the depth, a thicker layer is required below the common electrode 21, which complicates the fabrication and increases manufacturing costs and time. If the depression 22d is formed to be significantly wider, the liquid crystal 20 would be aligned in an unstable manner, thereby reducing an effective aperture ratio.

Further, Koike teaches away from replacing the depression 22d with the operation control window 33b (e.g., aperture) of Koma. This is because the alignment direction of the liquid crystal 20 under the influence of the depression is *substantially perpendicular* to the alignment direction under the influence of the aperture 33b of Koma. Thus, there is no technical validity to the assertion that the depression 22d can be replaced by an aperture.

Thus, it is submitted that claim 52 is patentable over Koike and Koma. Claims 55-76 that are dependent from claim 52 would be also patentable at least for the same reasons.

With respect to claims 77-80, independent claim 77 recites:

> "a first substrate including a pixel electrode having at least a wedge-shaped aperture; and
> a second substrate facing the first substrate and including a common electrode and at least a wedge-shaped protrusion on the common electrode, the protrusion being parallel and alternate to the aperture"

Similar to claim 52, claim 77 recites that an aperture is formed at the pixel electrode and the protrusion is formed at the common electrode. As previously mentioned, (a) the asserted combination of Koike and Koma fails to show "at least a wedge-shaped protrusion on the common electrode", as claimed, (b) Koike does not disclose a depression of the common electrode 21 generating a fringe field that influences alignment of the liquid crystal 20, and (c) there is no technical validity to the assertion that the depression 22d can be replaced by an aperture. Thus, it is submitted that claim 77 is patentable over Koike and Koma.

Further, the Examiner asserted "Applicant has not disclosed that shape solves any stated problem or is for any particular purposes" and "it appears that the invention would perform equally well with the depressed-shaped protrusion". This assertion is respectfully disagreed with.

With respect to Fig. 8A, the specification of the present application describes "a plurality of linear protrusion 170 … a plurality of linear aperture 270 … have substantially *wedge shapes*

. . ." (Page 16, lines 6-10) and "Therefore, four domains having different tilt directions are obtained in a single pixel to *enlarge viewing angle more than the first and the second embodiment*" (Page 16, lines 18-21). Thus, the Examiner is respectfully requested to withdraw the positions that "Applicant has not disclosed that shape solves any stated problem or is for any particular purposes" and "it appears that the invention would perform equally well with the depressed-shaped protrusion".

Koike fails to disclose the claimed "wedge-shaped protrusion", as the Examiner admitted in page 3 of the Office Action. Koma fails to cure this deficiency from Koike. Thus, it is submitted that the subject matter of claim 77 would not have been obvious over the asserted combination of Koike and Koma

For these reasons, it is submitted that claim 77 is patentable over the cited references. Claims 79-80 that are dependent from claim 77 would be also patentable at least for the same reasons. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 77-80.

With respect to independent claim 81, similar to claim 52, claim 81 recites "a plurality of protrusion formed on the common electrode" and "a pixel electrode having a plurality of aperture". As previously mentioned, these claimed features are believed to be patentable over the asserted combination of Koike and Koma.

With respect to claims 82-85, independent claim 82 recites:

> "forming a plurality of protrusions on a first substrate;
> forming a pixel electrode having a plurality of apertures on a second substrate; and
> assembling the first substrate and the second substrate . . ."

As previously mentioned, none of the cited references discloses or suggests "forming a plurality of protrusions on a first substrate". Also, as previously mentioned, (a) Koike does not disclose a depression of the common electrode 21 generating a fringe field that influences alignment of the liquid crystal 20, and (b) there is no technical validity to the assertion that the depression 22d can be replaced by an aperture.

For these reasons, the subject matter of claim 82 would not have been obvious over the asserted combination of Koike and Koma. Thus, it is submitted that claim 82 is patentable over the cited references. Claims 83-85 that are dependent from claim 82 would be also patentable at least for the same reason.

Accordingly, it is respectfully requested that the rejection under 35 U.S.C. §103(a) over claims 52 and 55-85.

Claims 53 and 54 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Koike in view of Koma and further in view of U. S. Patent No. 6,141,074 issued to Bos, et al. ("Bos"). This rejection is respectfully traversed.

Claims 53 and 54 are dependent from claim 53. As previously mentioned, independent claim 53 is believed to be patentable over Koike and Koma because, for example, the asserted combination still fails to show "a plurality of protrusions formed on the common electrode". Also, as previously mentioned, Koike does not disclose a depression of the common electrode 21 generating a fringe field that influences alignment of the liquid crystal 20, and there is no technical validity to the assertion that the depression 22d can be replaced by an aperture

Bos is directed to using liquid crystal having positive or negative dielectric anisotropy for wider view angles, but does not disclose or suggest "a plurality of protrusions formed on the common electrode". Also, Bos does not provide any conclusive evidence traversing Applicants' points that (a) Koike does not disclose a depression of the common electrode 21 generating a fringe field that influences alignment of the liquid crystal 20, and (b) there is no technical validity to the assertion that the depression 22d can be replaced by an aperture.

Since Bos fails to cure the deficiency from Koike and Koma, the subject matter of claim 52 would not have been obvious over the asserted combination of Koike, Koma and Bos. Thus, it is submitted that claim 52 is patentable over the cited references. Claims 53 and 54 that are dependent from claim 52 would be also patentable at least for the same reason.

Accordingly, it is respectfully requested that the rejection under 35 U.S.C. §103(a) over claims 53 and 54.

Double Patenting

Claims 52-102 stand provisionally rejected under the judicially created doctrine of obviousness type double patenting as being unpatentable over claims 4, 8, 9, 12-14 and 16 of U. S. Patent No. 6,714,837. This rejection is respectfully traversed.

First, it appears that the patent number which the Examiner provided is a typo because U. S. Patent No. 6,714,837 is directed to "Coupon applicator and methods of applying coupon strips to grocery carts". In replying this rejection, it is assumed that the Examiner is referring to U. S. Patent No. 6,710,837, which is the parent application of the present application.

Second, pursuant to 37 CFR 1.321(c), Applicants herewith submit a Terminal Disclaimer to overcome this provisional rejection. Thus, withdrawal of the rejection over claims 52-102 is respectfully requested.

CONCLUSION

Applicants believe that a full and complete response has been made to the pending Office Action and respectfully submits that all of the stated grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are allowable and that the application is in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact the Applicants' undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,

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